
Influenza: Questions and Answers

Information about the disease and vaccines

What causes influenza?

Viruses cause influenza. There are two basic types, A and B. Their genetic material differentiates them. Influenza A can cause moderate to severe illness in all age groups and infects humans and other animals. Influenza B causes milder disease and affects only humans, primarily children.

Subtypes of the type A influenza virus are identified by two antigens (proteins involved in the immune reaction) on the surface of the virus. These antigens can change, or mutate, over time. When a “shift” (major change) or a “drift” (minor change) occurs, a new influenza virus is born and an epidemic is likely among the unprotected population.

How does influenza spread?

Influenza is transmitted through the air from the respiratory tract of an infected person. It can also be transmitted by direct contact with respiratory droplets.

How long does it take to develop symptoms of influenza after being exposed?

The incubation period of influenza is usually two days but can range from one to five days.

What are the symptoms of influenza?

Typical influenza disease is characterized by abrupt onset of fever, aching muscles, sore throat, and non-productive cough. Additional symptoms may include runny nose, headache, a burning sensation in the chest, and eye pain and sensitivity to light. Typical influenza disease does not occur in every infected person. Someone who has been previously exposed to similar virus strains (through natural infection or vaccination) is less likely to develop serious clinical illness.

How serious is influenza?

Although many people think of influenza as a type of cold, it is really a specific and serious disease. Disease complications and death are more common among young children, the elderly, and those with chronic illnesses. In the United States, the number of influenza-associated deaths has increased since 1990. This increase is due in part to the substantial increase in the number of persons age 65 years or older, who are at increased risk for death from influenza complications. An average of 36,000 influenza-associated pulmonary and circulatory deaths per season occurred during 1990-1999, compared to

19,000 such deaths per influenza season during 1976-1990.

Influenza viruses cause disease among persons of all ages. Rates of infection are highest among children, but the risks for complications, hospitalizations, and deaths from influenza are higher among persons age 65 years or older, young children, and persons of any age who have medical conditions that place them at increased risk for complications from influenza. Case reports and several epidemiologic studies also indicate that pregnancy can increase the risk for serious medical complications of influenza.

In nursing homes, up to 60% of residents may be infected, with up to a 30% fatality rate in the infected. Risk for influenza-associated death is highest among the oldest elderly: persons age 85 years and older are 16 times more likely to die from an influenza-associated illness than persons aged 65-69 years.

Children age two years and younger have hospitalization rates second only to people age 65 years and older. Children younger than age one year are the most likely to be hospitalized. Influenza-associated deaths are uncommon among children but represent a substantial proportion of vaccine-preventable deaths. An estimated annual average of 92 influenza-related deaths occurred among children age 5 years or younger during the 1990s, compared with 32,651 deaths among adults age 65 years or older.

The cost of a severe epidemic has been estimated at \$12 billion. Occasionally, major epidemics occur on an international scale. This is known as a pandemic. The first recording of such an event was in 1580, and at least seven international epidemics have occurred in the nineteenth and twentieth centuries. The “Spanish flu” epidemic of 1918-1919 caused an estimated 21 million deaths worldwide, including more than 500,000 Americans.

How many people in the United States are hospitalized with influenza in a typical year?

A study conducted by CDC and published in the Journal of American Medical Association (JAMA) on September 15, 2004, provided new information on the number of people in the United States who are hospitalized from influenza-related complications

each year. The study was based on records from 1979 to 2001 from about 500 hospitals across the United States. The study concluded that, on average, more than 200,000 people in the United States are hospitalized each year for respiratory and heart-related illnesses associated with influenza virus infections.

What are possible complications from influenza?

The most frequent complication of influenza is bacterial pneumonia. Viral pneumonia is a less common complication but has a high fatality rate. Other complications include inflammation of the heart and worsening of such pulmonary diseases as bronchitis.

Reye's syndrome is a complication that occurs almost exclusively in children—patients suffer from severe vomiting and confusion, which may progress to coma because of swelling of the brain. To decrease the chance of developing Reye's syndrome, infants, children, and teenagers should not be given aspirin for fever reduction or pain relief.

What is the best way to prevent influenza?

The best way to prevent influenza is with annual vaccination.

Is there an alternative to vaccination in preventing influenza?

Vaccination is the principal means of preventing influenza and its complications. Here are some additional steps that may help prevent the spread of respiratory illnesses like influenza:

1. Cover your nose and mouth with your sleeve or a tissue when you cough or sneeze—throw the tissue away after you use it.
2. Wash your hands often with soap and water, especially after you cough or sneeze. If you are not near water, use an alcohol-based hand cleaner.
3. Stay away as much as you can from people who are sick.
4. If you get influenza, stay home from work or school. If you are sick, don't go near other people to avoid infecting them.
5. Try not to touch your eyes, nose, or mouth. Germs often spread this way.

There are four antiviral agents approved for preventing or treating influenza in selected patients. Only two, oseltamivir and zanamivir, will offer protection against both A and B viruses; the other two, amantadine and rimantadine, protect only against the A viruses. Their use is generally limited to situations where an outbreak is underway and immediate pro-

tection of vulnerable, unvaccinated persons is critical (e.g., nursing home residents) or in persons who are expected to have an inadequate antibody response to the vaccine (e.g., persons infected with HIV) or who could not otherwise be vaccinated (e.g., persons with severe egg allergies). Antiviral agents are not a substitute for vaccination. (Note: Recent evidence indicates that a high proportion of currently circulating influenza A viruses in the United States have developed resistance to amantadine and rimantadine so that these two antivirals cannot be used during the 2007-08 influenza season.)

If I contract influenza, what should I do?

Call your healthcare provider to discuss your particular situation. You will need to get plenty of rest and to drink a lot of liquids. You can take medications to relieve the symptoms of influenza (but never give aspirin to children or teenagers who have influenza-like symptoms, particularly fever). If you are at high risk from complications of influenza, you should consult your healthcare provider immediately if you develop influenza-like symptoms. Those at high risk for complications include people 65 years or older, people with chronic medical conditions, pregnant women, and young children. Your doctor may recommend use of an antiviral medication to help treat influenza.

When is a person with influenza contagious?

A person is most likely to pass on the virus during the period beginning one to two days before the onset of symptoms and ending four to five days after the onset.

Why can't we eradicate influenza as we are doing with some other vaccine-preventable diseases (e.g., polio)?

It is difficult to completely eliminate influenza for several reasons:

1. Influenza viruses mutate frequently, making it very difficult to provide one influenza vaccination that will protect an individual for life.
2. Each year's influenza vaccine is made up of three strains of the virus, based on an educated guess of which viruses will be most active during the upcoming influenza season. Occasionally, this projection may be wrong, and that year's vaccine will be less effective.
3. Influenza vaccine is not completely effective at preventing infection, especially with older individuals (although it does protect them from serious complications and death).

4. No attempt is made to vaccinate the entire population. Instead, influenza vaccine is mainly recommended for certain groups such as people over 50, healthcare workers, people with chronic underlying illnesses, and others. Most recently the vaccine was recommended for use in infants and children age 6-59 months.

Can you get influenza more than once?

Yes. Influenza viruses change frequently and infection with one strain does not provide protection against all strains.

When did influenza vaccine first become available?

The first influenza vaccine in the United States became available in 1945.

What kind of vaccine is it?

There are two types of influenza vaccine. The most common influenza vaccine is made from inactivated (killed) viruses. In June 2003, a live influenza vaccine was licensed. It contains live viruses that have been weakened (attenuated).

How are the vaccines made?

Every year, researchers and manufacturers develop a vaccine that contains virus strains they believe will be circulating in the upcoming influenza season. Influenza vaccine contains three viruses—two type A and one type B. The viruses selected for the vaccine are grown in chicken eggs.

For inactivated vaccine, the viruses are killed with formaldehyde, purified, and packaged in vials or syringes. The live vaccine is packaged in a special sprayer. About six months are required to produce influenza vaccine each year.

How is the vaccine given?

The inactivated vaccine is given as an intramuscular injection. The live attenuated vaccine is sprayed into the nose.

Who should get influenza vaccine?

Many groups of people can benefit from being protected from influenza.

Annual vaccination with inactivated vaccine is recommended for the following groups:

- All persons, including school-age children, who want to reduce the risk of becoming ill with influenza or of transmitting influenza to others
- Everyone age 50 years or older
- All children age 6-59 months
- Residents of long-term care facilities, nursing homes, and other chronic-care facilities

- Adults and children who have chronic pulmonary (including asthma), cardiovascular (except hypertension), renal, hepatic, hematological or metabolic disorders (including diabetes mellitus)
- Anyone who has a condition (e.g., spinal cord injury or seizure disorder) that can affect their ability to cough out their respiratory secretions or that can increase the risk for aspiration
- Anyone whose immune system is weakened because of the following: HIV/AIDS or other diseases that affect the immune system, long-term treatment with drugs such as steroids, or cancer treatment with x-rays or drugs
- Children and adolescents age 6 months-18 years on long-term aspirin treatment (who could develop Reye's syndrome if they catch influenza)
- Women who will be pregnant during the influenza season
- Healthcare personnel
- Healthy household contacts (including children) and caregivers of children younger than age 5 years and/or adults age 50 years and older
- Healthy household contacts (including children) and caregivers of persons with medical conditions that put them at higher risk for severe complications from influenza

The live nasal spray vaccine may only be used in healthy, nonpregnant persons age 2 through 49 years. Children younger than age two years, persons age 50 and older, and anyone with a chronic medical condition (listed above) should receive inactivated influenza vaccine (injectable), NOT live influenza vaccine.

What are the unique features of giving influenza vaccine to children compared with adults?

Children age 6 months through 8 years should receive two doses of influenza vaccine the first time they receive this vaccine, separated by at least 4 weeks. If a child age 6 months through 8 years only received one dose in their first year of vaccination, he/she should receive two doses the subsequent vaccination season.

Who recommends the influenza vaccine?

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), and the American College of Obstetricians and Gynecologists (ACOG) all recommend this vaccine.

How often should this vaccine be given?

Influenza vaccine is given once a year because immunity decreases after a year and because each year's vaccine is formulated to prevent only that year's anticipated influenza viruses.

When should persons be vaccinated?

The time to get influenza vaccine is whenever influenza vaccine becomes available for use. Vaccination should continue into the winter and spring, even until April or May. Travelers should be aware that the influenza season typically occurs from April to September in the Southern Hemisphere and throughout the year in the tropics. If they missed vaccination in the previous season, they should still be vaccinated before they travel, even if it's in the following spring or summer.

Are there recommendations for the prevention of influenza outbreaks in institutions?

The most important factor in preventing outbreaks is annual vaccination of all occupants of the facility and all persons working or volunteering in the facility who share the same air as the high-risk occupants. Groups that should be targeted include physicians, nurses, and all other personnel in hospitals, long-term care facilities, other care facilities, and outpatient settings who have contact with high-risk patients in all age groups.

Should siblings of a person with a chronic illness receive influenza vaccine even though the chronically ill person has been vaccinated?

Yes. All household contacts (who are age six months or older) of persons with "high-risk" conditions, of people age 50 years and older, or of children from birth through age 59 months, should receive annual influenza vaccination. Either inactivated or live vaccine may be used, except for household contacts and caregivers of people with severe immunosuppression in the care of a protective environment, who should receive only inactivated vaccine.

Should siblings of a healthy child who is younger than age 6 months be vaccinated?

Yes, all household contacts of children too young to be protected against influenza with vaccination should receive annual influenza vaccination to protect the younger child from serious infection. This is very important because these infants are too young to be vaccinated and are most vulnerable to complications from influenza.

Is it safe for pregnant women to get influenza vaccine?

Yes. In fact, vaccination with the inactivated vaccine is recommended for women who will be pregnant during the influenza season. Pregnant women are at increased risk for serious medical complications from influenza. One recent study found that the risk of influenza-related hospitalization was four times higher in healthy pregnant women in the fourteenth week of pregnancy or later than in nonpregnant women. In addition, vaccination of the mother will provide some protection for her newborn infant.

The live intranasal vaccine is not licensed for use in pregnant women. However, pregnant women do not need to avoid contact with persons recently vaccinated with this vaccine.

Vaccination is recommended for all persons, including breastfeeding mothers, who are contacts of infants or children from birth through age 59 months because infants and young children are at higher risk for influenza complications and are more likely to require medical care or hospitalization if infected. Women who are breastfeeding may receive either type of influenza vaccine unless the vaccine is not appropriate because of other medical conditions.

How safe is this vaccine?

Influenza vaccine is very safe. The most common side effects of the injectable (inactivated) influenza vaccine include soreness, redness, or swelling at the site of the injection. These reactions are temporary and occur in 15%–20% of recipients. Fewer than 1% of vaccine recipients develop such symptoms as fever, chills, and muscle aches. These symptoms are more likely to occur in a person who has never been exposed to the influenza virus or vaccine. Experiencing these non-specific side effects does not mean that you are getting influenza. These symptoms can persist for 1 to 2 days.

In clinical trials, the most common side effects of the intranasal influenza vaccine among adults were runny nose or nasal congestion (28%–78%), headache (16%–44%), and sore throat (15%–25%). Among children, side effects included runny nose or nasal congestion (20%–75%), headache (2%–46%), and fever (0%–26%).

Serious adverse reactions to either vaccine are very rare. Such reactions are most likely the result of an allergy to a vaccine component, such as the egg protein left in the vaccine after growing the virus. A vaccine, like any medicine, is capable of causing serious allergic reactions.

The risk of an influenza vaccine causing serious harm, or even death, is very rare. In 1976, the swine flu (injectable) vaccine was associated with an illness called Guillain-Barré syndrome (GBS), a nerve condition that can result in temporary paralysis. Injectable influenza vaccines since then have not been clearly linked with GBS, because the disease is so rare it is difficult to obtain a precise estimate of any increase in risk. However, if there is a risk of GBS from current influenza vaccines, it is estimated at one or two cases per million persons vaccinated—much less than the risk of severe influenza, which can be prevented by vaccination.

What can you tell me about the preservative thimerosal that is in injectable influenza vaccine and the claim that it might be associated with the development of autism?

Thimerosal is a very effective preservative that has been used to prevent bacterial contamination in vaccines for more than 50 years. It is comprised of a type of mercury known as ethylmercury. It is different from methylmercury, which is the form that is in fish and seafood. At very high levels, methylmercury can be toxic to people, especially to the neurological development of infants.

In recent years, several very large scientific studies have determined that thimerosal in vaccines does not lead to serious neurologic problems, including autism. Nonetheless, because we generally try to reduce people's exposure to mercury if at all possible, the vaccine manufacturers have voluntarily changed their production methods to produce vaccines that are now free of thimerosal or have only trace amounts. They have done this because it is possible to do, not because there was any evidence that the thimerosal was harmful.

How effective is influenza vaccine?

Protection from influenza vaccine varies by the similarity of the vaccine strain(s) to the circulating strains, and the age and health of the recipient. Healthy persons younger than age 65 years are more likely to have protection from their influenza vaccination than are older, frail individuals. It is important to understand that although the vaccine is not as effective in preventing influenza disease among the elderly, it is effective in preventing complications and death. In general, the immunity following influenza vaccination rarely lasts longer than a year.

When the “match” between vaccine and circulating strains is close, the injectable (inactivated) vaccine prevents influenza in about 70%-90% of healthy

persons younger than age 65 years. Among elderly persons living outside chronic-care facilities (such as nursing homes) and those persons with long-term (chronic) medical conditions, the influenza shot is 30%-70% effective in preventing hospitalization for pneumonia and influenza. Among elderly nursing home residents, the shot is most effective in preventing severe illness, secondary complications, and deaths related to influenza. In this population, the shot can be 50%-60% effective in preventing hospitalization or pneumonia and 80% effective in preventing death from influenza.

In one large study among children aged 15-85 months, the nasal-spray influenza vaccine (FluMist®) reduced the chance of influenza illness by 92% compared with placebo. In a study among adults, the participants were not specifically tested for influenza. However, the study found 19% fewer severe febrile respiratory tract illnesses, 24% fewer respiratory tract illnesses with fever, 23-27% fewer days of illness, 13-28% fewer lost work days, 15-41% fewer health care provider visits, and 43-47% less use of antibiotics compared with placebo.

Can the vaccine cause influenza?

No! This common misconception keeps many people from getting the influenza vaccine.

Neither the injectable vaccine nor the intranasal vaccine can cause influenza. The injectable influenza vaccine contains only killed viruses and cannot cause influenza disease. Fewer than 1% of people who are vaccinated develop influenza-like symptoms, such as mild fever and muscle aches, after vaccination. These side effects are not the same as having the actual disease.

The intranasal influenza vaccine does not cause influenza either. The intranasal influenza vaccine contains live attenuated viruses that can produce mild symptoms similar to a cold. While the viruses are able to replicate in the nose and throat tissue and produce protective immunity, they are attenuated and do not replicate effectively in the lung. Consequently, they cannot produce influenza disease.

Protective immunity develops 1 to 2 weeks after vaccination. Some people who get vaccinated later in the season (December or later) may get influenza shortly afterward, but the disease they develop is the result of being exposed to someone with the virus before the vaccine produced immunity, not the result of the vaccination.

Also, to many people “the flu” is any illness with fever and cold symptoms. If they get any viral illness,

they may blame it on the influenza shot or think they got “the flu” despite being vaccinated. Influenza vaccine only protects against certain influenza viruses, not all viruses.

Who should NOT receive influenza vaccine?

In general, the inactivated (injectable) influenza vaccine can be given to most everyone except children younger than age 6 months, persons with a history of a serious allergic reaction to eggs or to a previous dose of influenza vaccine (see additional contraindications below). The live, attenuated (intranasal) influenza vaccine is licensed for use only in healthy, nonpregnant individuals age 2 through 49 years.

The following persons should not be vaccinated with live virus intranasal influenza vaccine:

- Persons younger than age two years
- Persons age 50 years or older
- Persons with asthma, reactive airway disease or other chronic disorders of the pulmonary or cardiovascular systems; persons with other underlying medical conditions, including metabolic diseases such as diabetes, renal dysfunction, and hemoglobinopathy; or persons with known or suspected immune deficiency diseases or who are receiving immunosuppressive therapies
- Children ages 2 through 4 years with a history of recurrent wheezing
- Children or adolescents receiving long-term aspirin therapy
- Pregnant women
- Healthcare workers, household members, and others who have close contact with severely

immunocompromised individuals during the periods in which the immunosuppressed person requires care in a protective environment

Persons having had serious allergic reaction to eggs or to a previous dose of influenza vaccine should not receive either type of influenza vaccine (inactivated or live). Persons with a history of serious egg allergies who are at increased risk for influenza or its complications should consult with their healthcare provider regarding referral to an allergist to determine if the vaccine can be given following treatment for desensitization.

Persons with a history of Guillain-Barré syndrome should also consult with their physician before receiving this vaccine, so that the potential risks and benefits of influenza immunization can be weighed.

Persons who are moderately or severely ill at the time of their influenza vaccine appointment should usually wait until their symptoms are improved before getting the vaccine.

Some people believe they are allergic to thimerosal, the preservative used in some brands of influenza vaccine, because in the past they developed eye irritation after using eye drops containing thimerosal. Past eye irritation is no reason to avoid getting influenza vaccine. Only serious, life-threatening allergies to thimerosal are a reason not to be vaccinated. Most brands of influenza vaccine are packaged in vials or syringes that contain natural rubber or latex. Persons with a severe allergy to latex generally should not receive vaccine packaged in these vials or syringes.